FACT SHEET
Soil Vapor Extraction and Air Sparging

Department of the Navy RAB/TRC Training Workshop

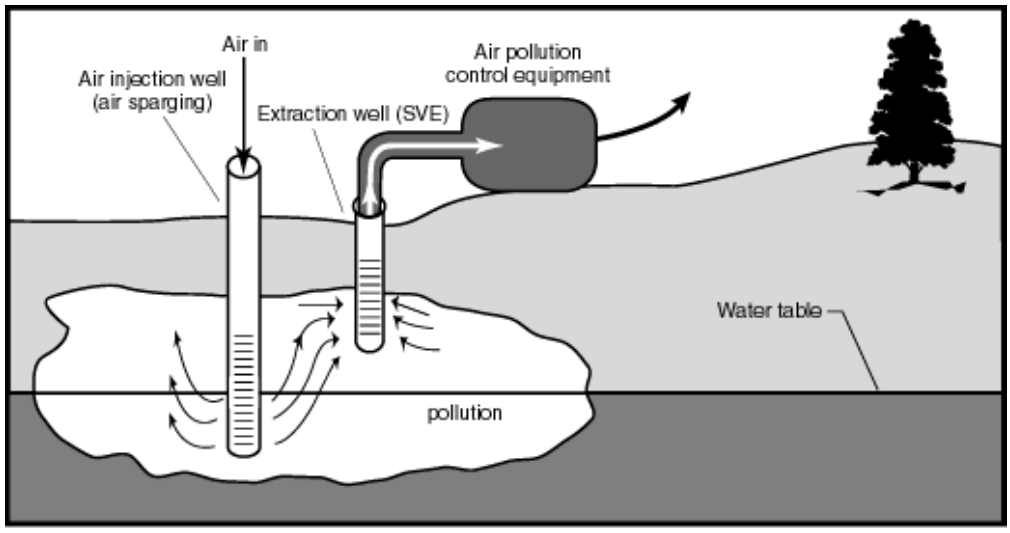
What are Soil Vapor Extraction (SVE) and Air Sparging?

Soil vapor extraction or *SVE* removes harmful chemicals, in the form of *vapor*s, from the soil above the water table, which is the level of groundwater below the ground surface. Vapors are the gases that form when chemicals evaporate. The vapors are extracted (removed) from the ground by applying a vacuum to pull the vapors out.

Air sparging uses air to help remove harmful vapors from polluted soil and groundwater below the water table. Spargin g is to introduce air or gas into (a liquid). When air is pumped underground, the chemicals evaporate faster, which makes them easier to remove. Like SVE, a vacuum then extracts the vapors. Certain chemicals—like solvents and fuel—evaporate easily. SVE and air sparging work best on these types of chemicals. SVE and air sparging are often used at the same time to clean up both soil and groundwater.

How does SVE and Air Sparging work?

SVE requires drilling *extraction wells* within the polluted area. These wells are drilled into the soil, but not the groundwater. Attached to the wells is equipment that creates a vacuum, which pulls air and vapors through the soil and up to the surface.
Air injection wells can be drilled to help the cleanup. Air injection wells pump air into the ground. The air causes the pollution to evaporate faster. Sometimes air vents are



used instead of air injection wells. Air vents don't pump air, but provide a passage for fresh air to enter the ground. The number of air injection and extraction wells can range from one to hundreds, depending on the size of the polluted area.

Once the extraction wells pull the air and vapors out of the ground, special air pollution control equipment collects them. The equipment separates the harmful vapors from the clean air. Then, the vapors *sorb* or stick to solid materials. Or they are condensed to liquids. These polluted solids and liquids are disposed of safely.

Air sparging works very much like SVE. However, the wells that pump air into the ground are drilled into water-soaked soil below the water table. Air pumped into the wells disturbs the groundwater. This helps the pollution change into vapors. The vapors rise into the drier soil above the groundwater and are pulled out of the ground by extraction wells. The harmful vapors are removed in the same way as SVE.

Why use SVE and Air Sparging?

SVE and air sparging are quicker than cleanup methods that rely on natural processes to do the work. In general, the wells and equipment are simple to install and maintain. And they can reach greater depths than methods that involve digging up soil. SVE and air sparging are effective at removing many types of pollution that can evaporate. Both methods can be used with other methods to clean up other types of pollution as well. Both methods work best in loose soils—like sand and gravel. But they both work well under many types of conditions.

Where has the Navy implemented SVE and Air Sparging?

A combination of SVE and Air Sparging was implemented at Naval Air Station (NAS) Cecil Field in rural southwest Jacksonville, Duval County, FL. The BRAC Cleanup Team (BCT) elected to use this technology to remove the contaminants, trichloroethylene (TCE) and other chlorinated solvents, from below the water table. This technology was initially performed on a pilot scale, because though it was a proven technology, it had never been used at such great depths (94 feet). Once the study indicated the system was operating successfully, it was scaled up to a full scale system.

References:

- A Citizen's Guide to Soil Vapor Extraction and Air Sparging. EPA's A Citizen's Guide Series
- Soil Vapor Extraction at Camp LeJeune Military Reservation, Site 82, Area A, Onslow County, North Carolina. 1998

For further information visit:
http://clu-in.org/techfocus/
http://www.frtr.gov/cost/